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MILL RESIDUE AVAILABILITY IN MONTANA

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MILL RESIDUE AVAILABILITY IN MONTANA

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Executive Summary:

Mill Residue Availability in Montana

Based on 1986 annual production levels, Montana sawmills and plywood plants should generate approximately 2,141 thousand cunits of wood fiber residue. A cunit is 100 cubic feet of solid wood approximately 2,500 pounds oven dry weight. An estimated 1,017 thousand of the 2,141 thousand cunits is coarse residue, 359 thousand cunits would be sawdust, 359 thousand cunits planer shavings, 424 thousand cunits bark residue, and 13 thousand cunits sander dust.

The annual supply of all mill residue should exceed regional demand in an average year.

When looking only at requirements for coarse residue, it appears that virtually all coarse residue produced is committed to use. Estimated supply of unutilized sawdust, planer shavings, and bark from sawmills and plywood plants in 1986 was 206 thousand cunits. The excess supply is available primarily from Lincoln and Flathead counties in northwestern Montana and from mills in central and southwestern Montana. Other timber processors should generate annually an estimated 30 to 60 thousand cunits of unutilized mill residue statewide.

Mill residue supplies can fluctuate sharply as lumber production fluctuates. Nineteen eighty-six was a year of record production in the lumber sector, and unutilized volumes of sawdust and bark were at higher than average levels.

Unutilized supplies of sawdust and bark have existed even in years of low lumber production. The excess during the recession year 1981, however, was substantially lower than the 1986 estimate. In spite of the fluctuation, unutilized volumes in Montana should be sufficient to supply a modest expansion of bark and sawdust use. Given no major sawmill closures, mills in southwestern Montana should be able to supply consistently 25 to 50 thousand cunits of a mix of sawdust, planer shavings, and bark annually to new users. A facility requiring substantially larger volumes annually could be supported in northwestern Montana using residue from mills not only in Montana but also Idaho and Canada.

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Mill Residue Availability in Montana

Mill residue from the lumber, plywood, and other timber processing plants is an important source of energy as well as a raw material for a variety of forest products industries in Montana. Mill residue is a general term used to describe the portion of timber delivered to a processing plant that does not become part of the final primary product. For example, all wood fiber delivered to a sawmill that is not part of the lumber produced is referred to as "mill residue." The term residue is somewhat misleading because currently much, but not all, of the mill residue material is used to produce products or as fuel.

Although mill residue is produced by all plants processing timber into primary wood products, over 95 percent of the mill residue generated in Montana comes from sawmills and plywood plants. The three types of wood fiber residue generated at sawmills and plywood plants are:

(1) Coarse or chippable residue consisting of slabs, edgings, and trim from lumber manufacturing, log ends from sawmills and plywood plants, pieces of veneer unsuitable for plywood manufacture, and peeler cores from plywood plants not sawn into lumber;

(2) Fine residue consisting of sawdust or planer shavings from sawmills and sander dust from plywood plants; and

(3) Bark from sawmills and plywood plants.

Other components of mill residue in the forest products industry include peelings and log ends from the post and pole industry; log ends, peelings, and sometimes slabs from the house log industry; and cull material from cedar products producers.

Current and projected residue requirements in Montana

The major current and projected uses of mill residue from Montana include the following:

1) *The pulp and paper industry.* This sector uses coarse residue and some fine residue (sawdust) for raw material to manufacture paper. Fine residue and bark are also used as fuel.

2) *Reconstituted board plants.* These plants include a particleboard plant and a fiberboard plant. The particleboard plant uses planer shavings as raw material. The fiberboard plant uses coarse residue planer shavings and sawdust as raw material.

3) *Power-generating facilities.* These units use primarily bark and fine residues. Also included here are some energy uses not in the other categories.

4) *Sawmills and plywood plants.* These plants use a portion of the fine residue and bark they generate in their own operations to dry lumber or generate heat in the winter, or both.

5) *Other uses.* There are several other uses of mill residue in the region, including decorative bark, garden mulch, pelletized wood fuel, residential fuelwood, and animal bedding. The volumes involved are small, however, and are not included in this analysis.

Estimates of the requirements for mill residue by pulp, board, and powerplants were developed from three sources:

1) Mill surveys (per sources 2, 3, 4, 5 in bibliography);

2) Discussions with industry and Forest Service personnel;

3) Various trade journals and other published sources (sources 1, 6, 7, and 10).

The demand for residue earmarked for winter heat and the drying of lumber, plywood, and veneer is based on estimates of 1) lumber and plywood production, and 2) the proportion of lumber production to be kiln dried. This study assumes that sawmills will require 3 pounds of steam per board foot for drying and winter heat, and plywood plants will require 2.5 pounds of steam per square foot (3/8-inch basis) of plywood produced for winter heat, veneer drying, and hot presses. This steam volume translates into approximately 0.4 dry pound of hog fuel per board foot of lumber production and 0.3 dry pound per square foot (3/8-inch basis) of plywood production. Approximately 80 percent of the lumber produced in Montana is kiln dried (sources 4, 5).

Estimating the supply of mill residue

In this analysis, the estimated volume of annual lumber and plywood production was used to estimate the volume of mill residue generated. Statewide averages were used for residue factors, which were developed from mill surveys and from additional information obtained from the industry. They represent the estimated volume of residue the mills would currently recover for a given volume of lumber or plywood production and are discussed below.

Sawmills in Montana generate, on average, 1.19 cunits of mill residue per thousand board feet of lumber produced. Of this amount, coarse residue would account for .53 cunit, sawdust .23, planer shavings .21, and bark .22 cunit. Plywood plants generate .42 cunit of residue per thousand square feet of 3/8-inch plywood produced. On the average, .28 cunit would be coarse residue, .02 cunit fine residue, and .12 cunit would be bark. These factors were applied to lumber and plywood production reported by the Western Wood Products Association and the American Plywood Association. Residue from other wood

products manufacturers was estimated based on 1981 production levels and discussion with several producers.

Residue production

Given 1986 annual production (1,563 million board feet of lumber and 671 million square feet of plywood), Montana sawmills and plywood plants should generate approximately 2,141 thousand cunits of wood fiber residue. Of this volume, an estimated 1,017 thousand cunits would be coarse residue, 359 thousand cunits sawdust, 328 thousand cunits planer shavings, 424 thousand cunits bark residue, and 13 thousand cunits sander dust. County level production is shown in table 1.

The volume of mill residue available from other sources is not reflected in table 1. Estimated annual volumes of mill residue generated by producers other than sawmills and plywood plants are 30 to 60 thousand cunits per year.

Demand versus supply

The current and projected near-term structure of the industry suggests the estimated annual supply of all mill residue should exceed demand in an average year.

When looking only at requirements for coarse residue, it appears that virtually all coarse residue is committed to use. Estimated supplies of unutilized sawdust, planer shavings, and bark in 1986 was 206 thousand cunits (see table 2 for details). It was mostly in the form of sawdust and bark. The excess supply of fine residue is available primarily from Lincoln and Flathead counties in northwestern Montana and from central and southwestern Montana. Montana mill residue available for energy use from 1986 production could have

produced approximately 3,600 million BTUs using a heating value of 8,500 BTUs per pound of wood. The fuel composition would be mostly bark and sawdust, with a moisture content of 40 to 50 percent. Planer shavings would have a moisture content of 10 to 20 per cunit. This resource could be obtained for less than $10 per cunit FOB the producing mill.

Table 2 on page 8 illustrates the estimated volumes of unutilized residue by county for 1986. *Be aware that a zero in a given area does not mean all residue in that county or area is committed to use. It means that if residue were selected strictly on the basis of proximity to the facilities using residue, then all residues in the areas showing zero would be utilized.*

Outlook

Mill residue supplies can fluctuate sharply as lumber production fluctuates. Record production in the lumber sector occurred in 1986. The pulp and paper industry and reconstituted board plants consuming residue also operated at high levels, and supplies of coarse residue were virtually all utilized. Because of the record lumber production levels, unutilized volumes of sawdust, planer shavings, and bark were at higher than average levels.

Historically, supplies of coarse residue have been in short supply during years of low lumber production. This is because the production levels by consuming facilities, primarily the pulp and paper industry, have not declined as much as lumber production. This could be the case in the future for planer shavings because of expansion in the particleboard industry scheduled for completion in late 1987.

Unutilized supplies of sawdust and bark have existed even in years of low lumber production. The excess during the recession year 1981, however, was

substantially lower than the 1986 estimate. In spite of supply fluctuations, unutilized volumes in Montana should be sufficient to supply a modest expansion of bark and sawdust use. Given no major sawmill closures, mills in southwestern Montana (the Beaverhead County group and some counties in the Broadwater County group) should be able to supply consistently 25 to 50 thousand cunits of sawdust, planer shavings, and bark annually to new users. A facility requiring substantially larger annual volumes could be supported in northwestern Montana using residue from not only Montana mills but also from Idaho and Canada.

A similar program and analysis available through the Idaho Department of Water Resources in Boise deals with that state's mill residue availability. Discussion with Canadian lumber producers indicates unutilized supplies of bark and sawdust within a 100-mile haul to areas in Idaho and Montana should exceed 100 thousand cunits annually.

Table 1

Mill Residue Produced
Montana
1986
(In Thousands of Cunits)

	Coarse	Sawdust	Sander Dust	Planer Shavings	Bark	Total
Residue from lumber production[1]	829	359	0	328	343	1,859
Beaverhead, Gallatin, Park	144	50	0	44	47	255
Broadwater, Fergus, Judith Basin, Lewis & Clark, Meagher, Wheatland	51	22	0	21	21	115
Carbon, Musselshell, Rosebud	3	1	0	1	1	6
Flathead	167	73	0	65	69	374
Granite, Powell, Ravalli	97	42	0	38	41	218
Lake, Mineral, Sanders	104	44	0	41	43	232
Lincoln	159	69	0	63	65	356
Missoula	134	58	0	55	56	303
Residue from plywood production[1]	188	0	13	0	81	282
Total Montana	**1,017**	359	**13**	**328**	**424**	**2,141**

[1]Statewide production.

NOTE: A cunit is 100 cubic feet of solid wood and approximately 2,500 pounds oven dry weight. The energy equivalent of 1 cunit of residue is approximately 21 million BTUs.

Table 2

Unutilized Fine Residue and Bark
Montana
1986
(In Thousands of Cunits)

Supply Source	Sawdust	Sander Dust	Planer Shavings	Bark	Total
Beaverhead Area	50	0	14	19	83
Broadwater Area	22	0	21	8	51
Carbon Area	1	0	1	1	3
Flathead County	9	0	0	29	38
Granite Area	0	0	0	0	0
Lake Area	0	0	0	0	0
Lincoln County	9	0	0	22	31
Missoula County	0	0	0	0	0
Total	91	0	36	79	206

NOTE: A cunit is 100 cubic feet of solid wood and approximately 2,500 pounds oven dry weight. The energy equivalent of 1 cunit of residue is approximately 21 million BTUs.

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Appendix
Grant Administration

The project was completed in three milestones. The total contract amount was $4,968.

Milestone 1

This milestone involved updating supply and demand estimates for mill residue in Montana and providing estimates of total and unutilized volumes for calendar year 1986. This was done for the state as a whole and for counties or county groups used as standard reporting entities by the Western Wood Products Association.

Milestone 2

Task 1: Development of a method to estimate the impact of various factors on the total supply and unutilized volumes of mill residue.

Task 2: Development of an IBM-compatible microcomputer program and user's manual that enables users to vary the factors affecting mill residue supply and demand and to estimate total and unutilized volumes.

Milestone 3

Preparation of draft report and final report.

Time Schedule and Cost Estimate

An interim report on milestone 1 was prepared by March 31, 1987. The contract amount to complete milestone 1 was $1,880.

The contract amount to complete milestone 2 was $2,240. The manual, diskettes, and program were prepared by May 31, 1987.

The draft report was completed by June 30, 1987 and the final report by November 1987. The contract amount to complete milestone 3 was $850.

In-kind Service from Other Sources

In-kind services from other sources used to support this project were $2,422 in waived University of Montana indirect cost and $4,968 from the Idaho State Department of Water Resources.

Peer Review

The peer review was done by Richard Lane, Stone Container Corporation; Paul Moore, Montana Division of Forestry; Pat Fox, Bonneville Power Administration; and Howard Haines, Montana Department of Natural Resources and Conservation.